**Homeostasis and Transport Review Sheet**

**Passive Transport**

* Passive transport is movement across a cell membrane that does not require energy.
* Molecules move from high to low concentration until equilibrium is reached.
* There are four main types of passive transport:
  + Simple diffusion – molecules move through the lipid bilayer.
  + Facilitated diffusion – molecules move through carrier proteins in the membrane.
  + Osmosis – water diffuses through the lipid bilayer.
* Solute concentration determines if an environment is hypertonic, isotonic

or hypotonic.

* Solvent concentration determines the direction of water movement.
  + Ion channels – ions like Cl- move through carrier proteins in the membrane.
* The type of transport is dependent on different factors about the cell and its environment:
* Substances that are small and/or nonpolar can simple diffusion through the lipids.
  + Ex: oxygen or carbon dioxide
* Substances that are large and/or polar must use facilitated diffusion carriers.
  + Ex: glucose or hydrophilic amino acids
* A hypertonic environment will cause water to move out of a cell and shrivel.
  + Ex: saltwater
* A hypotonic environment will cause water to move into a cell and distend it.
  + Ex: distilled water
* An isotonic environment will cause water to move into/out of a cell equally.
  + Ex: freshwater

**Active Transport**

* Active transport is movement across a cell membrane that requires energy.
* Molecules are moved from an area of low to high concentration and does not result in

equilibrium being reached.

* There are three main types of active transport:
  + The sodium-potassium pump – Na+ and K+ move using a carrier protein pump.
  + Exocytosis – molecules travel out of the cell using a vesicle formed from the membrane.
  + Endocytosis – molecules travel into the cell using a vesicle formed from the membrane.
* The type of transport is based on direction that substances need to go.
* The Na-K pump moves Na+ out and K+  in using energy from ATP.
  + Needed in animal cells for conducting nerve impulses.
* Exocytosis is used small substances that need to be exported and imported into another cell or for large ones that would not fit through a carrier protein.
* Ex: hormones that need to circulate to other organs
* Endocytosis is used to engulf large macromolecules in solution or whole cells.
* Ex: bacteria cells being engulfed by a white blood cell to be destroyed.

**Bioenergetics Review Sheet**

**Photosynthesis**

* Only autotrophs such as plants, protists and bacteria can carry out the reactions because their cells contain light capturing pigments including chlorophyll.
* These organisms take in water and carbon dioxide and convert it to sugar and oxygen.
* The process takes place in the chloroplast where chlorophyll absorbs light.
* Leaf pores called stomata assist in the movement of gasses. They are open to let

carbon dioxide in and water and oxygen out.

* The Light reactions occur first and they take place in the thylakoid of the chloroplast.
* Water inside of the thylakoid is split by an enzyme. The electrons from water move into a photosystem containing chlorophyll molecules where they capture sunlight energy and transfer it along the ETC and finally become part of the NADPH energy storage molecule.
  + Hydrogen ions diffuse through an ATP synthase protein where they provide energy to produce ATP. The H+ then become part of the NADPH molecule also.
  + Oxygen atoms pair up and diffuse out of the chloroplast as a waste material.
* The purpose of the light reactions is to transform solar energy into chemical energy.
* The Dark reactions take place in the stroma solution of the chloroplast.
* Carbon dioxide is split into a CO group and O. The oxygen atoms produced pair up and diffuse out of the chloroplast.
  + The CO group moves through a series of molecules in the Calvin cycle. The energy for this to occur comes from the breakdown of ATP.
  + The CO group binds to two H atoms when NADPH molecules are broken down.
* After six turns of the cycle COH2 units combine to form one glucose molecule.
* The purpose of the dark reactions is to transform the chemical energy into organic energy.

**Cellular Respiration**

* Organisms take in sugar and oxygen and convert them into water, carbon dioxide and ATP.
* The process takes place in the cytosol and/or mitochondria and involves the conversion

of organic energy to chemical energy.

* Anaerobic pathways take place when oxygen is not present.
* In the first stage glycolysis occurs in the cytosol where glucose is converted to pyruvic acid and NADH and 2 ATP molecules are made.
  + In the second stage called fermentation pyruvic acid is broken down to produce either lactic acid or ethanol and regenerate NAD+.
* Aerobic respiration take place when oxygen is available and generates much more energy.
  + In the first stage glycolysis occurs in the cytosol just like in anaerobic respiration.
* The second stage consists of four phases that take place in the mitochondria
* First pyruvic acid is broken down into acetyl-CoA, NADH and CO2.
* Next the acetyl-CoA enters the Kreb’s cycle and is converted to NADH, FADH2, CO2 and ATP in the matrix also.
* Then all of the NADH and FADH2 produced releases H+ and e-. The e- enter the ETC and the H+ diffuses though the ATP synthase to produce ATP.
* Finally the e- s exit the ETC and bind to oxygen atoms as the final acceptor. The oxygen then binds to H+ to form water molecules inside of the matrix.